In the Drawings

Please replace the drawings with Figures 1-7, contained in Replacement Sheets 1-5. No new matter is submitted.

REMARKS

Election

The combination of Groups I and II as defined in the prior restriction requirement is hereby acknowledged. The Examiner is thanked for this action, taken in light of comments provided in the previous response.

Specification

In accordance with the Examiner's suggestions, the heading "Detailed Description of the Drawings" has been amended to read "Detailed Description of the Invention". It is respectfully requested that this objection be withdrawn.

Drawings

The drawings are objected to because the reference character "40" is used to describe both a core and a microwave source. In light of the amendment above, to paragraph 27, it is respectfully submitted that the reference numeral "40" designates only a core. Thus, it is respectfully submitted that the drawings conform with 37 CFR 1.84(p)(4), because the reference numeral "40" designates only a core. It is respectfully requested that this ground for objection be removed.

Replacement sheets 1-5 are submitted herewith to replace the existing drawing sheets. The replacement sheets contain formal drawings for Figures 1-7. Previously, Figure 7 was not in formal form. No new matter has been added.

Rejection §112

Claims 1-10 currently stand rejected under the second paragraph of §112 as being indefinite. This rejection is based on the assertion that it is unclear whether the wet slurry that is coated onto the fibrous substrate includes the dielectric reducing agent. Claim 1 has been amended to read "...providing a wet slurry containing sodium silicate and a dielectric reducing agent..." Thus, it is respectfully requested that this objection be withdrawn.

ARGUMENTS

Claims 1-11, 13-14 and 24-29 are pending in the application. Claims 12 and 15 are hereby cancelled. Claims 16-22 have been withdrawn. The pending claims stand rejected as being obvious in light of combinations of WO 99/01276 (the '276 reference), US 2,922,729 to Dereich and US 3,748,204 to Murayama et al. It is respectfully submitted that none of these references contains any motivation or suggestion to combine the ideas disclosed therein. Accordingly, it is requested that the outstanding rejections be withdrawn and that a notice of allowance be issued.

Independent Claims 1, 10 and 24

Claims 1 and 24 define a provide method of forming articles from fibrous substrates. Each claim recites *inter alia* the steps of: 1) coating a fibrous substrate with a wet slurry of sodium silicate and a dielectric reducing agent; 2) drying the coated substrate; 3) exposing the substrate to microwave energy to activate the adhesive; and 4) forming the substrate into the shape of an article.

Claim 10 has been amended to recite a method of creating a hollow cylindrical core from at least two substrates including the application of adhesive having sodium silicate and a dielectric reducing agent and the step of activating the adhesive by microwave energy. Thus, claim 10 is addressed in connection with claims 1 and 24.

The '276 reference is cited as teaching the steps of forming a hollow cylindrical core. Specifically, it is asserted that the '276 reference teaches winding the substrate, activating dried adhesive and forming the core on a mandrel. As admitted in the Action, the '276 reference makes no mention whatsoever of sodium silicate adhesive, microwave activation or the use of dielectric reducing agents. In fact, only vague references are made to water and heat activation of adhesives. (See page 5, lines 14-25.) Given the vagueness of the '276 reference, there is no suggestion to combine its teachings with either microwave activation or a sodium silicate adhesive, let alone a microwave activatable sodium silicate adhesive with a dielectric reducing agent.

Dereich is cited as teaching a sodium silicate adhesive including sugar, which is deemed to be a dielectric reducing agent. It is suggested that it would have been obvious to combine Dereich with the '276 reference because Dereich provides an improved product. However, Dereich has nothing to do with microwave activation or dielectric reducing agents. The use of sugar in Dereich is only in combination with a number of other chemicals to achieve the desired result, namely a lack of adhesion to a metal hot plate during activation and improved water resistance. Thus, while the

Action asserts that Dereich defines an improved product, it has nothing to do with creating that product using microwave energy or the use of sugar as a dielectric reducing agent in microwave activation of the adhesive.

Dereich combines sodium silicate adhesive with a compound containing urea-formaldehyde and sugar. (See Column 3, lines 8-10.) The stated goals of Dereich's is to provide an adhesive which does not stick to heated metal surfaces during the activation process and has improved water resistance. (See Column 1, lines 19-24). The primary element used in moisture resistance in Dereich is the silicate. (See Declaration of Arnold B. Floyd, Jr., Paragraph 7.) Contrary to the suggestion in the present Office Action, sugar has nothing to do with the moisture resistance of the adhesive in Dereich. In fact, sugar is highly soluble and thus would not provide moisture resistance. (See Declaration of Arnold B. Floyd, Jr., Paragraph 7.)

The combination in Dereich is to prevent adhesive from sticking to an activating hot plate. (See Column 2, lines 29-50.) Because the goal of this invention is to improve the process of hot plate activation, one skilled would not think to use its teachings with microwave activation. Moreover, an adhesive with improved moisture resistance would not be used in the present case. The adhesive in the present case is activated by solubilizing latent water in the fibrous substrate. (See Declaration of Arnold B. Floyd, Jr., Paragraph 6.) Thus, Dereich actually teaches away from the cited combination of references.

Dereich does not suggest or disclose the use of a dielectric reducing agent or microwave activation. Further, the '276 reference also does not mention the use of either a sodium silicate adhesive, with or without a dielectric reducing agent, or microwave activation. Thus, these references do not suggest claimed combinations.

Murayama is cited as teaching the use of microwave energy to activate adhesive by heating latent moisture in a substrate. Murayama teaches the use of microwaves to heat a paper substrate contained between two polymeric resin layers, for lamination of the paper. (See Declaration of Arnold B. Floyd, Jr., Paragraph 8.) This may be done with or without adhesive. Thus, the adhesive is not a critical factor in Murayama. There is not even a mention of using microwave to activate adhesive. Rather, Murayama simply teaches the use of microwave energy to heat the water in the paper, and thus the polymeric resin layers, to cause the polymeric resin to melt and form a deeper bond to the paper fibers that formed in normal lamination. (See Column 2, Lines 43-52.) Contrary to the subject matter of the present invention, where water is used to solubilize the adhesive, the water in Murayama is simply used as a heat generator when exposed to microwaves. Thus, the functionality of Murayama and the present invention are entirely different.

Additionally, Murayama is inapplicable to the other references cited. As mentioned above, claims 1, 10 and 24, as well as the '276 reference, recite the steps forming an article around a mandrel. Murayama teaches the lamination of paper between two polymer webs, rather than forming an article from a fibrous substrate, using a mandrel. Thus, Murayama provides no combination to supplement its teachings with the '276 reference.

Furthermore, adhesive used in accordance with Murayama's teachings is not activated by the microwave energy. Like the water, the adhesive absorbs the microwave energy and serves as a heat generator, further melting the polymeric resins. (See Murayama, Column 4, lines 26-43 and Declaration of Arnold B. Floyd, Jr., paragraph 8.) Murayama states that the polymeric resins serve to prevent the latent water from leaving the paper substrate, thus preventing scorching during the microwave activation. These characteristics are contrary to the present invention, where the adhesive has a dielectric reducing agent and migration of latent water from the substrate into the adhesive is desired for activation. (See Declaration of Arnold B. Floyd, Jr., Paragraph 8.)

The proposed combination of the '276 reference, Dereich and Murayama is based on impermissible hindsight. The claims must be considered as a whole and not just a laundry list of elements that need to be found in various places in the prior art. None of the cited references provides a suggestion to combine it with the other cited references to form Applicant's invention. As such, reconsideration and withdrawal of this rejection to claims 1, 10 and 24, as well as the claims which depend therefrom, is respectfully requested.

Claims 13 and 25

Claims 13 and 25 recite that the dielectric reducing agent of claims 10 and 24 is a sugar. Dereich is cited as showing the use of sugar and sodium silicate as an adhesive. It is further asserted that Dereich teaches that such an adhesive provides improved moisture resistance. Thus, the Office Action concludes that would have been obvious to combine Dereich with the other references. As stated in detail with respect to claims 1, 10 and 25, Dereich is inapplicable to the subject matter of the claimed invention. Dereich does not teach the use or suggest the desirability of using sugar as a dielectric reducing agent in a microwave energy activation process. Rather, Dereich teaches the use of urea-formaldehyde, modified with sugar to provide an adhesive that does not stick to a hot plate activator and has improved moisture resistance. Dereich actually teaches away from the present invention because the adhesive used in the present invention is solubilized. Thus, an adhesive with improved water resistance would resist activation, rather than providing an improved product. For these reasons, reconsideration and withdrawal of the rejections to claims 13 and 25 is respectfully requested.

Claims 4 and 14

Claims 4 and 14 recite weight ratios of sodium silicate to sugar ranging from 95:5 to 65:35. Dereich is cited as teaching an adhesive including 90 parts sodium silicate and 10 parts sugar. This is simply not so. Dereich teaches a combination of many different ingredients, consisting primarily of sodium silicate, urea-formaldehyed, water, sugar and propylene glycol. Dereich teaches that, at a maximum, the combination contains 10% by weight of the resin made from combining the urea-formaldehyde, sugar and other components. Within the resin, the sugar makes up no more than half of the total weight (See Examples A and B). This is not the equivalent of having 10 parts of sugar to 90 parts sodium silicate. In fact, Dereich teaches that the weight of sugar is less than 5% of the total combination. Thus, Dereich does not teach the ranges in claims 4, 14 and 25. Reconsideration and withdrawal of this rejection is respectfully requested.

Claims 5-7 and 27-28

Claims 5 and 17 recite the step of forming an article comprising winding the coated substrate around a mandrel. The '276 reference is cited as teaching the winding a substrate around a mandrel and activating the adhesive to form a core. However, because the cited references fail to teach the steps in the independent claims from which they depend, claims 5 and 17 are not rendered obvious.

Claims 6 and 28 recite the step of winding overlapping web layers to form a tube. Although the action makes no mention of overlapping layers of the substrates on the mandrel, it is submitted that even if this step were shown in the art, these claims are not obvious for the reasons set forth regarding claims 1 and 24.

Claim 7 recites winding the coated substrate around a mandrel comprising a substantially microwave invisible material. It is asserted in the action that because Murayama teaches "a process for activating an adhesive placed between a plurality of substrates, applying microwave energy that is absorbed by said substrates such that the residual moisture in said substrates is heated to therefore heat the adhesive between said substrates." For this assertion, the action points to claim 1 of Murayama. This assertion is contrary to the teachings of claim 1, as well as the rest of Murayama. Murayama does not teach adhesive placed between a plurality of substrates, and claim 1 makes no mention whatsoever of activating an adhesive. Rather, a single substrate is placed between two polymer webs and heated using microwave energy to melt the polymer. Murayama teaches that the microwave energy generates heat at the interfaces between the paper support and the synthetic resin (polymer web) coatings. Any adhesion in Murayama is due to the melting of the webs and subsequent entanglement in the fibers of the substrate. This process is not an activation of an adhesive. Furthermore, there is no mention of a mandrel or a need for a mandrel in Murayama because the articles in Murayama are not formed into a desired shape. They simply remain flat. Thus, the lamination process of Murayama has nothing to do with any type of mandrel, let alone a microwave invisible mandrel.

For the reasons set forth above, the reconsideration and withdrawal of the rejections to claims 5-7 and 28-29 is respectfully requested.

Claims 2-3 and 26

Claims 2-3 and 26 recite various ranges of moisture content from 1-15% for the substrate, after the drying step. It is asserted in the Action that these ranges are simply a result effective variable because "the amount of heat developed at the interface is dependent on the residual moisture content." While it is true that the two values are related, the intended result (i.e. the desired temperature) is not disclosed or suggested in any of the prior art references. Thus, because no result is suggested, no variable to achieve that result can be considered obvious. The only reference that deals with using microwave energy to heat latent water in a substrate does so in the context of sealing polymer webs to the paper by melting the polymer. This procedure is not applicable to the claims 2-3 and 26 because the microwave activation therein is being used to solubilize water, not melt polymer webs. Furthermore, there is no mention that the desired temperature values for the two processes are the same. Accordingly, reconsideration and withdrawal of this grounds for rejection is respectfully requested.

Claim 9

Claim 9 recites the step of applying a protective coating to the activatable adhesive after the drying step. It is submitted in the action that the substrate in the '276 reference forms an adhesive protective coating upon its rolling. The protective coating in claim 9 is provided in addition to the substrate, which is already provided in claim 1. Moreover, this step is different than simply rolling the substrate to cover the adhesive, because the substrate, adhesive and protective coating combination of claim 9 does not need to be rolled to protect the adhesive.

It is further asserted that it is "well known to protect a moisture-activated adhesive by applying a protective coating that is removed upon activation of said adhesive." This assertion is inapplicable to claim 9 for two reasons. First, statements that modifications are well within the ordinary skill of the art...are not sufficient without some objective reason to combine the teachings of the references (See MPEP 2143.01 §IV). None of the cited references provides any suggestion to apply a protective coating to the adhesive, and thus, there is no independent support for this assertion. Second, the protective coating described in claim 9, as supported by the specification, is not removed prior to activation, rather it is dissolved into the adhesive upon activation. (See paragraph 41 of the application.) Thus, the assertion that it is well known to apply a removable coating has nothing to do with the coating step of claim 9. Reconsideration and withdrawal of this grounds for rejection to claim 9 is respectfully requested.

Claim 8

Claim 8 recites using the activatable web as an outer substrate and providing an inner substrate, with the adhesive located between the two substrates, pressing the substrates together and pressing the hybrid web onto a cylindrical mandrel. It is asserted that the '276 reference teaches a process using two substrates wherein a first substrate includes an activatable adhesive to bond the substrates together. The '276 reference does not suggest the relationship between the inner and outer substrates, or the location of the adhesive on the inner strip. Rather, the cited passage from the '276 reference is simply a general discussion of how the teachings therein can be used with multiple substrates, which may or may not have adhesive thereon. This general blurb in the '276 reference does nothing to suggest the steps of claim 8. Accordingly, reconsideration and withdrawal of this ground for rejection is respectfully requested.

Claim 29

Claim 29 recites that the forming step occurs prior to the activating step. It is asserted in the action that this is merely an inversion of a process step without any unexpected results and it would have thus been obvious.

This step is much more than a mere inversion of previously known steps because the teachings Dereich are specifically suited for activation prior to forming an article. Dereich teaches an adhesive composition that is designed to reduce the buildup of adhesive residue on an activating hot plate. Dereich refers only to direct contact between the activation means and the adhesive. This teaching does not apply to activating adhesive after forming an article, because the adhesive is enclosed by substrates once the article is formed. Thus, one skilled in the art would not look to use the adhesive of Dereich for activation after forming an article. Accordingly, reconsideration and withdrawal of this grounds for rejection is respectfully requested.

Claim 11

The limitation of claim 11, namely the application of pressure to a hybrid web after activating adhesive holding the web together, is not specifically addressed in the office action. It is asserted that the '276 reference teaches the application of pressure to the wound substrate to bond the substrate into a hollow cylindrical core. However, the application of pressure to a hybrid web, or at any point after activation of adhesive, is not mentioned in the '276 reference. It is therefore requested that the rejection of claim 11 be reconsidered and withdrawn.

Claim 23

Claim 23 recites applying non-activated adhesive in the form of a wet slurry. Dereich is cited as teaching sodium silicate adhesive including sugar. However, Dereich makes no mention of applying the non-activated adhesive in the form of a wet slurry. Furthermore, there is no suggestion in Dereich, or any of the other references to use a wet slurry to apply non-activated adhesive. Thus, this limitation is not shown or suggested in the cited references. Reconsideration and withdrawal of this rejection is respectfully requested.

Further Comments

The method claimed in claims 1, 10 and 24, as well as the dependent claims, includes the steps of applying an adhesive of sodium silicate and a dielectric reducing agent to a fibrous substrate, activating the adhesive using microwave energy and winding the substrate on a mandrel. The claimed invention was achieved through testing of microwave activation with various adhesives. The microwaves activated the sodium silicate very quickly and dry out the adhesive if the microwaves were not stopped. This is because sodium silicate has dielectric properties which cause it to generate heat when exposed to microwaves, similar to the adhesives mention in Murayama

(Column 4, lines 36-43). The heat generated by the adhesive is undesirable. The sodium silicate adhesive has a tendency to scorch when activated using microwave energy, thus reducing the adhesion between substrates. To stop scorching the adhesive, microwave energy had to be applied in very short bursts, making activation difficult to control. The introduction of dielectric reducing agents, such as sugar, make the sodium silicate less likely to scorch by reducing its dielectric properties, and thus its susceptibility to microwaves.

Attached hereto, as Appendix A, is the Declaration of Arnold B. Floyd, Jr., a named inventor, attesting to certain test results related to substrates coated with sodium silicate adhesive and substrates coated with sodium silicate adhesive containing sugar. Both tests were performed using two 1" x 1" squares of fibrous substrate (paper), placed in a microwave at 1200 watts, for times of one and two minutes. The tests using only sodium silicate, indicated by the letters A and B on the results page, produced no bond (shown as 0% tear strength). The tests using 10% sugar in sodium silicate, indicated by the letters C and D on the results page, produced a complete bond between the substrates (shown as 100% tear strength).

As described above, it was found through experimentation that the use of a dielectric reducing agent, such as sugar, greatly improves the use of microwave energy to activate sodium silicate adhesive in forming articles from fibrous substrates. The dielectric reducing agent expands the window of time that the adhesive can be exposed to microwaves, the activation window, without scorching the substrate. (See Declaration of Arnold B. Floyd, Jr., Paragraph 5.) This result was arrived at by testing without any prior knowledge of the dielectric properties of sugar. (See Declaration of Arnold B. Floyd, Jr., Paragraph 3.) These results show how the presently claimed process is an improvement over the prior art, using methods not taught therein. Accordingly, it is respectfully requested that the outstanding rejections to claims 1-11, 13-14 and 23-29.

CONCLUSION

For the reasons set forth above, it is respectfully submitted that the present application is in condition for allowance. Prompt action to that end is respectfully requested.

Respectfully submitted,

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